

# **EXHIBIT V**

UNITED STATES DISTRICT COURT  
DISTRICT OF NEW HAMPSHIRE

MARY SAUCEDO, )  
MAUREEN P. HEARD, and )  
THOMAS FITZPATRICK, D.B.A. )  
Plaintiffs, )  
v. ) Civil Case No. 1:17-cv-183-LM  
WILLIAM M. GARDNER, Secretary of )  
State of the State of New Hampshire, in his )  
official capacity, and THE SECRETARY )  
OF STATE'S OFFICE OF THE STATE )  
OF NEW HAMPSHIRE, )  
Defendants. )



**DECLARATION OF LINTON A. MOHAMMED**

I, LINTON A. MOHAMMED, declare that:

1. I am a Forensic Document Examiner (“FDE”), certified by the American Board of Forensic Document Examiners. I have been engaged in this matter on behalf of Plaintiffs. I make this declaration based upon my personal knowledge unless otherwise specified.

**I. QUALIFICATIONS**

2. I am a U.S.-certified and internationally recognized FDE, and the focus of my research and professional experience is on handwriting and signature identification and the scientific approach to analyzing questioned signatures. I am, and since 1998 continuously have been, certified by the American Board of Forensic Document Examiners (ABFDE), the certifying board for FDEs in North America. I am also certified in document examination by the Chartered Society of Forensic Sciences (United Kingdom). I specialize in the forensic science of analyzing genuine, disguised, and simulated signatures.

3. I co-founded and I am currently the principal at Forensic Science Consultants, Inc., where I conduct forensic document examination casework and research on handwriting and signature identification as well as other forensic document examination (e.g., document alterations, obliterations, indented impressions, or pages added or removed). I am also an adjunct instructor at Oklahoma State University, where I teach graduate courses on the scientific examination of questioned documents. I previously spent approximately fourteen years conducting forensic document, handwriting, and signature examination and research at Forensic Science Consultants, Inc. doing business as Rile, Hicks, & Mohammed and Associated Document Examiners.

4. During and prior to my time with Associated Document Examiners, and for nearly fourteen years, I worked as Forensic Document Examiner and Senior Document Examiner for the San Diego Sheriff's Department Regional Crime Laboratory. There I conducted examinations of signatures and handwriting for cases investigated by San Diego County agencies as well as by local police, state, and federal agencies. I also served as Technical Lead of the Questioned Documents Section of the Regional Crime Laboratory, trained investigators and attorneys, provided expert testimony, conducted research, and produced the Questioned Documents Section Quality Manuals. Prior to that, I worked internationally as an FDE at the Laboratory of the Government Chemist (England), Caribbean Institute of Forensic Investigations Ltd. (West Indies), and Trinidad and Tobago Forensic Science Center (West Indies). In those roles, I conducted forensic document examinations and testified in criminal and civil cases for multiple police forces and other government agencies.

5. I am a Fellow of the Questioned Documents Section of the American Academy of Forensic Sciences (AAFS), a member and diplomate of the Forensic Science Society, and a

member of the Canadian Society of Forensic Science. I currently serve as the Chair of the AAFS Questioned Documents Section. I am an appointed member of the Academy Standards Board, which was formed by the AAFS to develop documentary standards for the forensic sciences. I am also a current member of the National Institute of Standards and Technology's Expert Working Group on Human Facts in Handwriting Examination, the National Institute of Standards and Technology Organization of Scientific Area Committees Physics/Pattern Interpretation Scientific Area Committee, and the Scientific Working Group on Documents. I have previously served as President, Vice President, Treasurer, and Director of the American Society of Questioned Document Examiners (ASQDE).

6. I am also an editorial reviewer of forensic sciences and document examination journals. In particular, I am an editorial review board member of the Journal of Forensic Sciences, Journal of the American Society of Questioned Document Examiners, and Forensic Science and Technology. I am also a guest reviewer for the following journals: Forensic Science International, Science & Justice, Australian Journal of Forensic Science, Egyptian Journal of Forensic Sciences, and IEEE Transactions on Cybernetics.

7. I have published thirteen articles on handwriting identification and forensic document examination. Many of my articles focus on the analysis of genuine and forged signatures and handwriting comparison. I co-authored a book in 2012 titled "The Neuroscience of Handwriting: Applications for Forensic Document Examination," which integrates research in the fields of motor control, neuroscience, kinematics, and robotics to evaluate questioned signatures and handwriting. In particular, the book sets forth, among other things, the scientific fundamentals of motor control as relevant to handwriting; the impact of age, disease, and medication on handwriting; and a quantitative approach to signature authentication, including kinematic and

laboratory analyses of genuine versus disguised versus forged signatures. I have also given numerous presentations on signature examination worldwide, including in the United States, Saudi Arabia, Australia, China, Canada, Brazil, Latvia, Turkey, and Poland. In 2012, I received the American Board of Forensic Document Examiners' New Horizon Award in recognition of my "exceptional contributions in scientific research for the advancement of forensic document examination."

8. In addition, I have testified as an expert witness more than 100 times on issues of signature, handwriting, and document examination in both civil and criminal cases, including cases in the United States, England, Trinidad & Tobago, and St. Vincent. I have also written and presented on robust empirical- and scientific-based expert witness testimony in the field of document examination.

9. I received a Ph.D. from La Trobe University in Melbourne, Australia in human biosciences, where I wrote my thesis on signature identification: "Elucidating static and dynamic features to discriminate between signature disguise and signature forgery behavior." Prior to that, I received my undergraduate degree in science at the University of West Indies; underwent a two-year training program in document examination at the Trinidad and Tobago Forensic Science Center; and received a master's degree in forensic sciences at National University in San Diego, California.

10. My *curriculum vitae* is attached as Exhibit 1. I am being compensated at a rate of \$350 per hour. My compensation in this matter is not in any way contingent on the content of my opinion or the outcome of this matter.

## II. BACKGROUND

11. Based on my review of the Amended Complaint in this lawsuit, I understand New Hampshire elections law requires local election officials (“moderators”) to reject an absentee ballot if it “appears” that the signature on the absentee ballot affidavit envelope does not match the signature on the absentee ballot application. *See RSA 659:50(III).*

12. Moderators are instructed to “compare the signature on the affidavit with the signature on the application for the ballot” to determine if “[t]he signature on the affidavit appears to be executed by the same person who signed the application.” *Id.*

13. This statute requires moderators to reject absentee ballots which, in their judgment, appear to contain signatures on the absentee ballot affidavit envelope that differ from the signatures on the absentee ballot application.

14. When a moderator rejects an absentee ballot under this statute, the voter is never informed of the decision and there is no interaction with the voter to determine whether the ballot was lawfully cast, or if there is an explanation for the perceived signature differences.

15. I understand that elections officials are lay individuals, meaning that they are not required to have any training, certification, or experience in document examination or signature comparison.

16. . I understand that there are no meaningful formalized statewide standards or procedures for moderators to evaluate whether an absentee ballot envelope signature matches the signature used to apply for the absentee ballot.

17. I have reviewed the 2016-2017 Elections Manual regarding matching signatures, which states:

“The test for whether the application and affidavit appear to be signed by the same person is whether this is more likely than not. Absentee ballots should be rejected because the signatures do not match only if the differences in the signatures are significant.”

N.H. Dep’t of State, N.H. Election Procedure Manual: 2016-2017, 38, *available at* <http://sos.nh.gov/Elections.aspx>. The Election Manual further notes: “[I]t is a natural and common occurrence that a person’s signature will change over time and will have differences even when the person writes out his or her signature several times, one immediately after another.” *Id.* at p. 67.

18. The N.H. Election Procedure Manual does not set forth standards for determining “whether the application and affidavit appear to be signed by the same person,” or what constitutes a difference in signatures that is “significant.”

19. Based on my review of Exhibit A to the Amended Complaint, I understand that the Attorney General’s Office also informed local election officers in advance of the 2016 general election that “[m]oderators should be aware that a person’s signature often varies depending on the circumstances, and it is often hard to tell whether two signatures were written by the same person.” See Oct. 31, 2016 A.G. Memo. at p. 4.

20. Neither document clarifies or provides guidance on how an elections official determines whether the absentee ballot application and affidavit envelope signatures are signed by the same person.

21. I was retained by Petitioners to determine existing flaws, if any, in the procedures and techniques of the New Hampshire signature-verification process for absentee ballots as set forth in New Hampshire elections laws.

22. In reaching my conclusions, I reviewed (i) RSA 659:50(III), (ii) the N.H. Election Procedure Manual: 2016-2017, (iii) the Oct. 31, 2016 Attorney General Memo, (iv) 2016

absentee ballot applications and absentee ballot affidavit envelopes from Nashua, Derry, and Hollis, and New Hampton, (v) Plaintiffs' Amended Complaint for Declaratory and Injunctive Relief, and (vi) academic and empirical literature, as well as additional materials referenced in this Declaration.

23. As discovery is ongoing and documents continue to be exchanged as part of this process, I reserve the right to supplement my opinions if and when new information becomes available during the course of this litigation.

### III. SUMMARY OF CONCLUSIONS

24. The New Hampshire signature match requirement, and related guidance, does not set forth functional standards for determining when an absentee ballot application and envelope affidavit are not signed by the same person.

25. New Hampshire also does not require elections officials to have any training in signature examination, and does not require elections officials be provided examination equipment. Based on my experience and my review of the academic literature, it is my opinion that in these circumstances, elections officials are likely to make erroneous signature-comparison determinations.

26. Determining whether a signature is genuine is a difficult task for even a trained FDE, as signatures are written in different styles with varying levels of readability and variability. And laypersons have a significantly higher rate of error in determining whether signatures are genuine. Laypersons are also more likely to wrongly determine that authentic signatures are *not* genuine than to make the opposite error. In other words, lay elections officials are more likely than trained examiners to make an incorrect signature-comparison determination and are particularly likely to incorrectly decide that the signatures do *not* "compare."

27. In my opinion, this high rate of error among laypersons generally results from an incorrect determination that “variations” between one individual’s signatures are instead “differences” between multiple individuals’ signatures. An individual’s signatures may vary for myriad reasons, including age, health, native language, and writing conditions. Laypersons’ failure to properly account for signature variability leads to erroneous inauthenticity determinations, which are particularly pronounced in populations with greater signature variability, such as elderly, disabled, ill, and non-native English signatories.

28. These signature-determination errors are further compounded for elections officials with diminished eyesight or “form blindness” (a type of impairment in visual perception defined below)—both of which impact an individual’s ability to make accurate handwriting authenticity determinations. While FDEs are screened for these traits, elections officials are not required to undergo such a screening.

29. Nor does New Hampshire require that moderators compare more than two signatures or spend a minimal amount of time in making a signature determination. These omissions are likely to lead to additional erroneous determinations. At a minimum, ten signature samples are required for an accurate signature determination to account for an individual’s signature variability, but New Hampshire only requires elections officials to compare ballot-envelope affidavit signatures to one sample. Further, elections officials are likely to have insufficient time to make accurate signature determinations.

30. In sum, it is my opinion that that the RSA 659:50(III) requirement that lay moderators, without training or standards, reject ballots with envelope signatures they deem non-genuine will result in a significant number of erroneous ballot rejections.

#### IV. ANALYSIS AND OPINIONS

##### A. Lay Individuals Are Likely to Make Erroneous Signature Comparison

###### Determinations.

31. Lay individuals are highly likely to make mistakes in making signature-comparison determinations and are particularly likely to conclude that signatures do not compare when they are in fact written by the same individual.

32. Determining whether signatures are made by the same individual or by different individuals requires a reviewer to determine whether a feature or combination of features in signatures are “differences” or “variations.” In the field of signature examination, unexplainable “*differences*” between signatures mean that different individuals wrote the signatures; whereas “*variations*” between signatures mean that one individual wrote the signatures. Determining whether signature features are “differences” or “variations” is one of the most difficult determinations in forensic signature examination.

33. To reliably make such a judgment requires, at a minimum:

- Extensive training with different types of signatures: Becoming an FDE requires at least two, generally three, years of full-time training with an experienced examiner, with at least eighteen months of training in the examination of signatures and handwriting. FDEs learn the science of signature examination, gain experience in casework, and are tested for proficiency.
- Adequate magnification and lighting equipment.
- Excellent eyesight.

- Adequate time: Insufficient time examining signatures is conducive to making errors.

For example, Merlino, et al. (2014),<sup>1</sup> found that FDEs spent more time looking at the questioned and known signatures than laypersons and were more accurate in the evaluation of the genuineness of signatures.

Without these elements, lay individuals are likely to mistake legitimate and expected “variations” between one individual’s signatures for “differences” in signatures between two individuals and conclude, incorrectly, that someone other than the registered voter signed a ballot envelope.

34. In fact, signature verification is inherently difficult, even for a trained FDE. For one, signatures are written in three different styles:

- Text-based: Nearly all of the letters can be interpreted.
- Mixed: More than two, but not all, letters can be interpreted.
- Stylized: No letters can be interpreted.

These signature styles exhibit significantly different characteristics that impact a determination of whether signatures are genuine. For example, kinematic features of signatures, such as size, velocity, changes of acceleration, and pen pressure are important in determining whether a signature is genuine. Yet these kinematic features vary between the same individual’s signatures, with the degree of variations often dependent on the signature style. The kinematic features of stylized signatures, for example, vary more significantly than the kinematic features of text-based signatures. These variations impact a reviewer’s ability to determine whether a

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<sup>1</sup> Merlino, M., Freeman, T., Dahis, V., Springer, V., et al. (2014). *Validity, Accuracy, Reliability, and Bias in Forensic Signature Identification*. NIJ Award Number: 2010-DN-BX-K271.

signature is genuine and would likely cause a lay person to decide that signatures exhibit “differences” when the changes in features are simply “variations.”

35. In addition, to determine whether signatures are made by the same individual, a reviewer should focus on holistic features of signatures, such as alignment, slant, pen lifts, rhythm, the size of writing, the slope or slant of the letters, or other characteristics that are diagnostic of the process used to create signatures. These features are subtle and a writer is usually unaware of the features, as they are excited via the writer’s subconscious motor program. These subtle features are significant as evidence of genuineness because they occur in naturally occurring handwriting. Lay persons, however, often focus instead on more eye-catching features in evaluating signatures. For example, an eye-tracking study on signature examination conducted by Merlino, et al. found that “. . . lay participants focused to a greater extent on individual features such as arches, eyelets, hooks, shoulders, connections, troughs, or other individual features” that catch the eye, and “appear[ed] less likely to use holistic features.” But focusing on these eye-catching features is problematic because these are also the features that a simulator will try to capture. Properly utilizing the subtle, holistic features of signatures to determine genuineness, however, requires both training and adequate time for review.

36. Further, an individual’s signatures may vary for myriad reasons, and to properly determine whether signatures are written by the same individual, one must know why features of the same individual’s signatures may visually appear different. In one of the leading textbooks on handwriting examination, authors Roy Huber & A.M. Headrick<sup>2</sup> identified twenty reasons an individual’s signatures many vary:

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<sup>2</sup> Huber, R. A. & Headrick, A.M. (1999). *Handwriting Identification: Facts and Fundamentals*. CRC Press, Boca Raton, FL.

- Adequacy of standards— inadequate standards in terms of quantity and contemporaneity will not be representative of the writer's range of variation. Variations may therefore be interpreted as differences.
- Accidental occurrences—i.e., these are one-off variations that will not appear in the specimen signatures. Misinterpretation may lead to a decision of difference versus variation.
- Alternative styles—i.e., some writers have alternate signature styles. This may not be represented in the specimens.
- Ambidexterity.
- Carelessness or negligence.
- Changes in the health condition of writer.
- Changes in the physical condition of writer—e.g., fractures, fatigue, or weakness may alter features of an individual's signature.
- Changes in the mental condition or state of the writer.
- Concentration on the act of writing.
- Disguise or deliberate change.
- Drugs or alcohol.
- Influence of medications.
- Intentional change for later denial.
- Nervous tension.
- Natural variations—i.e., inherent variation as a result of differences in neuro-muscular coordination.

- Writing conditions—e.g., the individual’s place or circumstances, such as in a moving vehicle or at a stationary table.
- Writing instrument—e.g., a pen versus a stylus.
- Writing position—e.g., the individual’s stance.
- Writing surface—e.g., paper versus electronic screen.
- Writing under stress.

Examiners must consider each of these reasons in determining whether a feature is “different” between two signatures or whether the feature is simply a “variation” from the same writer. A lay individual will not have the knowledge, training, and experience to properly account for these factors.

37. In addition, the signatures of poorly educated writers, writers for whom English is a second language, elderly writers, disabled writers (discussed in more detail below), and ill writers are more likely to exhibit wide ranges of variation. For instance, a writer who first learned to write in a non-Latin-based script, such as Chinese, will naturally show more variation when signing a document in English than a native writer. Likewise, where the voter’s native script is written right to left, such as Urdu, the voter’s signature may also be more likely to show variations in letter slanting. Qualified, experienced experts in the area of signature verification would know and account for these factors in evaluating signatures; lay people, even if put through a short training session, are unlikely to be able to accurately account for these differences, particularly in an expedient time frame or when only one or a few samples are available for comparison.

38. Laypersons also may have an issue called “form blindness” that impacts their ability to make consistently correct determinations as to the genuineness of a signature. Form blindness

is defined by Byrd and Bertram as “a combined physical and mental fault, an imperfection in the brain which causes the inability to interpret and correctly store what is actually focused on the human retina.”<sup>3</sup> Form blindness affects “the ability to see minute differences in angles, forms, and sizes.”<sup>4</sup> Most ophthalmologists agree that form perception is not an eye problem but rather a translational problem. Therefore, in most cases, form blindness goes undetected.<sup>5</sup> Form blindness, however, diminishes a reviewer’s ability to make accurate determinations of a signature’s genuineness. In *Questioned Document Problems*, considered an authoritative text in document examination, Albert S. Osborn reviews the effects of form blindness and concludes that “[i]n disputed document cases . . . difficult problems should not be submitted to untrained jurors, or judges, who are even only partially [form] blind.”<sup>6</sup> Osborn’s conclusion is further supported by a study with latent print (fingerprint) examiners, which showed that examiners who exhibited form blindness were significantly less likely to make accurate fingerprint comparisons. Signature comparison, like fingerprint comparison, is inherently reliant on the ability of the examiner to observe and retain fine details; thus a reviewer who is form blind will be particularly likely to make egregious errors in calling a signature genuine or non-genuine. But while FDEs must pass a form blindness test before being trained in handwriting identification, New Hampshire requires no such test for elections officials. There is thus a risk that some elections

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<sup>3</sup> Byrd, J. & Bertram, D. (2003). *Form-blindness*. J. Forensic Identification 53 (3).

<sup>4</sup> Bertram, Dean James, “Form Blindness Testing: Assessing the Ability to Perform Latent Print Examination by Traditional Versus Nontraditional Students” (2009). Dissertations. 996 <http://aquila.usm.edu/dissertations/996>.

<sup>5</sup> *Id.*

<sup>6</sup> Osborn, A.S. (1991). *Questioned Document Problems 2<sup>nd</sup> Ed.*, Chapter XXIV Montclair, New Jersey Patterson Smith.

officials have form blindness and are particularly prone to making erroneous signature determinations.

39. Ultimately, laypersons make significantly more errors in determining the genuineness of signatures than FDEs. The most pronounced difference is in so-called Type II error rates, in which authentic signatures are declared non-genuine. In a 2001 study comparing the error rates of FDEs with the error rates of laypersons in comparing six genuine signatures with six non-genuine signatures, laypersons made Type II errors in 26.1% of cases while trained signature FDEs made such errors in 7.05% of cases.<sup>7</sup> That means that laypersons are more than 3 ½ times more likely to declare an authentic signature non-genuine—which, in the case of absentee ballot signatures, would mean that elections officials would reject more than 3 ½ times the number of ballots than FDEs.

40. This study also found that laypersons are much more likely to make these Type II errors than Type I errors (Type I meaning an incorrect determination that non-genuine signatures are authentic), although laypersons are still substantially more likely to make Type I errors than trained FDEs (laypersons made Type I errors in 6.47% of cases while trained FDEs made such errors in 0.49% of cases).<sup>8</sup> A Type II error is considered among FDEs as being more egregious than a Type I error for signature verification and would mean in New Hampshire’s absentee balloting system that a genuine signature is called non-genuine, and the voter’s ballot rejected incorrectly.

41. Similarly, a study conducted in Australia found that FDEs were statistically better than laypersons in determining genuineness or non-genuineness. The FDE group had a 3.4%

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<sup>7</sup> Kam M., Gummadidala K., Fielding G., Conn R. (2001). *Signature authentication by forensic document examiners*. J. Forensic Sci., 46 (4):884-888.

<sup>8</sup> *Id.*

error rate while the laypersons had a 19.3% error rate.<sup>9</sup> It must be noted that these error rates occurred when adequate signature samples and examination time were available. It can safely be assumed that the error rate will rise when inadequate comparison samples and time are available to the screener.

42. It must be also noted that laypersons are all the more likely to incorrectly find authentic signatures of poorly educated writers, writers for whom English is a second language, elderly writers, disabled writers, and ill writers to be non-genuine. The increased variations in the signatures of these groups only compound laypersons' tendencies to err on the side of incorrectly finding authentic signatures to be non-genuine.

**B. Even Trained Forensic Document Examiners Are Likely to Make Erroneous Signature Comparison Determinations Under New Hampshire's Standards for Examining Absentee Ballots.**

43. Even for trained FDEs, New Hampshire's absentee ballot signature comparisons are prone to erroneous determinations due to the limited number of comparison signatures, and the lack of proper equipment.

44. Normally, FDEs require at least 10 specimen signatures for comparison with a questioned signature, and often more if issues such as age or illness are involved. These specimens are required to adequately determine the range of variation of the writer and properly account for the reasons for variation within an individual's signatures discussed above. Indeed, nobody signs the same way twice: no two complex, skillfully written, genuine signatures of one writer have ever been found to be exactly alike at the microscopic level. This is so because signatures are the product of a motor program developed in the brain after practice and then

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<sup>9</sup> Sita, J., Found, B., & Rogers, D. (2002). *Forensic handwriting examiners expertise for signature comparison*. J. Forensic Sci. 47(5).

executed with neuro-muscular coordination, and many factors can influence an individual's motor program and neuro-muscular coordination, including the factors discussed above. Inadequacy of standards is cited as a source of error by Huber & Headrick.<sup>10</sup> Inadequate standards means that the writer's range of variation is not represented fully. Features observed in the questioned signature(s) may not be observed in the inadequate specimens. This may lead to an erroneous interpretation of a feature as a difference (two writers) or variation (one writer). Elections officials, however, are required to compare the ballot-envelope signature with only the absentee ballot application signature.

45. Finally, as discussed above, New Hampshire law does not require elections officials be provided proper equipment, such as magnification and lighting equipment. Without this equipment, even a well-trained eye may make errors in a signature authenticity determination.

### C. Voters with Disabilities

46. I have reviewed several absentee applications and affidavit envelopes submitted by voters who indicated that they voted absentee during the 2016 general election due to their disability.

47. For example, Plaintiff Sylvia Glenn from Nashua is disabled and voted by absentee ballot due to her disability during the 2016 general election. Based on her address (55 Kent Lane), it appears that she lives in senior housing.<sup>11</sup>

48. I have inspected Ms. Glenn's absentee ballot application and affidavit envelope, and observed that both the signature on the Application for State Election Absentee Ballot and the

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<sup>10</sup> Huber, R.A. & Headrick, A.M. (1999). *Handwriting Identification: Facts and Fundamentals*. CRC Press, Boca Raton, FL.

<sup>11</sup> The Huntington at Nashua is located at 55 Kent Lane and is a senior living community. See <http://www.silverstoneliving.org/the-huntington-at-nashua>.

signature on the State Absentee Ballot Affidavit envelope exhibit tremor and lack of pen control.

The formation of the uppercase “G” in “Glenn,” at first glance, could be viewed as pictorially dissimilar in both documents. The pictorial dissimilarity may be due simply to normal natural variation in Ms. Glenn’s signature style, or due to a disability. However, with only two signatures for inter-comparison, there is no way to tell definitively if the dissimilarity is due to variation (one writer), or a difference (two different writers).

49. I understand that due to recent amendments to the relevant voting rights statutes, moderators are instructed to “compare the signature on the affidavit with the signature on the application for the ballot” to determine if “[t]he signature on the affidavit appears to be executed by the same person who signed the application, *unless the voter received assistance because the voter is blind or has a disability.*” RSA 659:50(III) (emphasis added). As well, voters are now instructed on their absentee ballot application that, “The signature on this affidavit must match the signature on the application for an absentee ballot or the ballot may be rejected. Any person who assists a voter with a disability in executing this form [requesting an absentee ballot] shall make a statement acknowledging the assistance on the application form to assist the moderator when comparing signatures on election day.” And “after marking the ballot, the voter or the person assisting a blind voter or voter with a disability who is unable to mark his or her ballot shall enclose and seal the same in an inner envelope. The voter shall execute the affidavit on the envelope. A person assisting a blind voter or voter with a disability who needs assistance executing the affidavit shall sign a statement on the affidavit envelope acknowledging the assistance.”

50. These changes do not resolve the concerns raised in my analysis above. Whenever signatures are checked, there will still be only two signatures of the voter for comparison – one

on the Application and one on the Absentee Ballot Affidavit Envelope. Individuals with disabilities who have not received (or are unable to receive) assistance, but who have poor handwriting may still also not have their vote counted.

51. I note that the signature on the Absentee Ballot Affidavit Envelope is written above a clear notice of penalties for fraudulent signatures. This may influence the voter to execute a more formal version of their normal signature on the Affidavit Envelope which may appear pictorially dissimilar to the signature on the Application (which may have been executed more casually).

52. For the reasons stated herein, it is my professional opinion that New Hampshire moderators are likely to make erroneous determinations of whether ballot-envelope affidavit signatures compare to absentee ballot application signatures, and, in particular, determine that authentic signatures are not genuine. These erroneous determinations result from an inherent difficulty in making reliable forensic signature determinations, a system in which inadequate comparison signatures and equipment are available, and an inability of untrained laypersons to distinguish between signature variations of one individual and signature difference between multiple individuals. In this context, an incorrect signature determination can lead to voters' ballots being rejected even though the signature on the application was written by the same individual who signed the absentee ballot affidavit envelope.

I declare under penalty of perjury that the foregoing is true and correct.

Executed at BURLINGAME, CA on this 17 day of November, 2017.

  
Linton Mohammed  
Linton Mohammed, Ph.D., D-ABFDE

## **EXHIBIT 1**

# Forensic Science Consultants, Inc.

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Linton A. Mohammed, Ph.D.  
Forensic Document Examiner

Diplomate: American Board of Forensic Document Examiners  
Diploma in Document Examination - Forensic Science Society (England)  
American Society of Questioned Document Examiners  
(Member & Past-President)  
American Academy of Forensic Sciences (Fellow)

## Linton A. Mohammed CURRICULUM VITAE

### WORK EXPERIENCE

#### **Forensic Science Consultants, Inc., 01/2012 - present**

San Francisco, CA

Duties: Forensic Document Examination, expert testimony; research; management.

#### **dba Rile, Hicks, & Mohammed, Forensic Document Examiners, 10/2010 – 01/2012**

Long Beach, CA; San Francisco, CA

Duties: Forensic Document Examination, expert testimony; research; management.

#### **dba Associated Document Examiners, 10/1997 – 09/2010**

[with approval of San Diego County Sheriff's Department]

San Diego, CA

Duties: Forensic Document Examination, expert testimony; research; management.

#### **San Diego County Sheriff's Department Regional Crime Laboratory, 08/1996 – 10/2010**

San Diego, CA

Senior Forensic Document Examiner, (2002 – 2010)

Forensic Document Examiner, (1996 – 2002)

Duties:

Conducted examinations in the most complex cases involving: signatures, handwriting, typewriting, machine printing, commercial printing, photocopies, hand stamps, ink, paper, indented impressions, binding materials; restoration and decipherment of alterations, erasures, and obliterations.

Technical Lead - Questioned Documents Section.

Provided training and mentorship for junior examiners. Principal trainer in Forensic Document Examination for Marie Durina (07/2003- 08/2006) and Brenda Lanners (10/2009- 09/2010).

Provided training for investigators and attorneys.

Provided expert testimony in courts of law.

## CURRICULUM VITAE – LINTON A. MOHAMMED

Conducted research, presented results at forensic science conferences, and published in peer-reviewed journals.

Produced and maintained the Questioned Documents Section Quality Manuals. Oversaw the Questioned Documents Section's ASCLD-LAB accreditation status. Acted as an Audit Team Captain or part of audit teams as per the Laboratory's ASCLD-LAB accreditation protocols.

Participated in proficiency testing.

### **Laboratory of the Government Chemist, 07/1993 – 07/1996**

Teddington, Middlesex, England

Forensic Document Examiner

### **Caribbean Institute of Forensic Investigations Ltd., 06/1992 – 07/1993**

Forensic Document Examiner

Trinidad, West Indies

### **Trinidad and Tobago Forensic Science Center, 01/1989 – 06/1992**

Forensic Document Examiner; Safety Officer

Trinidad, West Indies

### **Trinidad and Tobago Forensic Science Center, 12/1986 – 12/1988**

Chemist 1

Two-year full-time training program in Document Examination. (December 1986- December 1988) at the Trinidad and Tobago Forensic Science Center, Port of Spain, Trinidad. Mr. Robert Fawcett (Staff Sergeant [retired], Royal Canadian Mounted Police) conducted the training, which included the examination of: signatures, handwriting, typewriting, machine printing, commercial printing, photocopies, hand stamps, ink, paper, indented impressions, binding materials; restoration of alterations, erasures, and obliterations, photography, and court testimony.

## EDUCATION

### **Ph.D. (Human Biosciences)**

La Trobe University, Melbourne, Australia, 2012 Thesis: "*Elucidating spatial and dynamic features to discriminate between signature disguise and signature forgery behavior*"

Supervisors: Assoc. Prof. Doug Rogers and Dr. Bryan Found

### **Master of Forensic Sciences**

National University, San Diego, CA, 2005

### **Bachelor of Science (General) [Honors]**

University of the West Indies, St. Augustine, Trinidad & Tobago, 1984

## CURRICULUM VITAE – LINTON A. MOHAMMED

### TEACHING EXPERIENCE

**Oklahoma State University, 2006 – present:**

**Adjunct Instructor,**

Master of Forensic Sciences Administration and Graduate Certificate in Questioned Documents (online programs)

- Graduate course: Historical Aspects of Questioned Documents (4 hours per week during a semester)
- Graduate course: Technical Aspects of Questioned Documents (4 hours per week during a semester).

### PROFESSIONAL CERTIFICATIONS

- Certificate of Qualification in Forensic Document Examination (No. 298) *American Board of Forensic Document Examiners, Inc.*, 1998 (re-certified every 5 years since 1998 to present).
- Diploma in Document Examination *Chartered Society of Forensic Sciences*, 1996 (re-certified every 5 years since 1996 to present).

### TESTIMONY EXPERIENCE

Testified over 100 times as an expert witness in Forensic Document Examination in USA (Federal & State courts, depositions), England (High Court & Magistrates' Court), and the Caribbean (High Court & Magistrates' Court).

### AWARDS

**New Horizon Award** – American Board of Forensic Document Examiners, Inc., 2012. (In Recognition of Exceptional Contributions in Scientific Research for the Advancement of Forensic Document Examination).

### PUBLICATIONS

#### Book

Caligiuri, M. & Mohammed, L. *The Neuroscience of Handwriting: Applications for Forensic Document Examination*. Taylor & Francis: Boca Raton, 2012.

#### Papers

1. Mohammed, L., Found, B., Caligiuri, M., Rogers, D. (2015). *Dynamic Characteristics of Signatures: Effects of Writer Style on Genuine and Simulated Signatures*. Journal of Forensic Sciences, January 2015, Vol. 60, No.1.

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2. Mohammed L.A. (2013). *History of the Forensic Examination of Documents*. In: Siegel JA and Saukko PJ (eds.) Encyclopedia of Forensic Sciences, Second Edition, pp. 386-390. Waltham: Academic Press.
3. Caligiuri, M., Mohammed, L., Found, B., & Rogers, D. (2012). *Nonadherence to the Isochrony Principle in Forged Signatures*. Forensic Science International 223 (2012) 228–232.
4. Mohammed, L., Found, B., Caligiuri, M., Rogers, D. (2011). *The Dynamic Character of Disguise Behavior for Text-Based, Mixed, and Stylized Signatures*. J Forensic Sci, January 2011, Vol. 56, No. S1 pp. S136-141).
5. Mohammed, L., Ostrum, B. (2010). *Using Adobe Photomerge™ for Demonstrative Evidence*, Journal of the American Society of Questioned Document Examiners, Vol. 13, No. 1.
6. Mohammed, L.A. (2009). *Alterations, Erasures, and Obliterations of Documents*, in Wiley Encyclopedia of Forensic Science, Jamieson, A., Moenssens, A. (eds). John Wiley & Sons Ltd., Chichester, UK, pp. 128-134.
7. Mohammed, L., Found, B., Rogers, D. (2008). *Frequency of Signature Styles in San Diego County* – Journal of the American Society of Questioned Document Examiners, Vol. 11 (1).
8. Mohammed, L., Richards, G. (2006). *Thinking Outside the Box* – Journal of the American Society of Questioned Document Examiners, Vol. 9 (2).
9. Mohammed, L., Jenkinson, G. (2002). *Association of counterfeit documents to a printing plate by means of half tone dots* – Journal of the American Society of Questioned Document Examiners, Vol. 5 (1).
10. Mohammed, L. (1999). *Write-On™: A new tool for handwriting comparison* - Journal of the American Society of Questioned Document Examiners, Vol. 2 (2).
11. Mohammed, L. (1999). *An evaluation of documents produced by a high-speed, high-volume scanning process* - Forensic Science Communications, Vol. 1 (3).
12. Mohammed, L. (1998). *Sequencing writing impressions and laser printing or ink-jet printing using the ESDA* - Journal of the American Society of Questioned Document Examiners, Vol. 1 (1).
13. Mohammed, L. (1993). *Signature disguise in Trinidad and Tobago* - Journal of the Forensic Science Society, Vol. 33 (1).

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**PRESENTATIONS**

**Workshops**

- *The Forensic Examination of Original and Copied Signatures*
  - Presented at The Midwestern Association of Forensic Sciences Conference, Cincinnati, OH 2017
- *Likelihood Approach and Document Examination: What For?*
  - Co-presented with Liv Cadola and Tobin Tanaka at the 21<sup>st</sup> Triennial Meeting of the International Association of Forensic Sciences, Toronto, Canada 2017
- *The Examination of Skillfully Simulated Arabic Signatures*
  - Presented at the 2<sup>nd</sup> Saudi International Conference on Forensic Medicine and Sciences, Riyadh, Kingdom of Saudi Arabia 2017
- *The Forensic Examination of Genuine, Disguised, and Simulated Signatures with an Introduction to Kinematics of Handwriting*
  - Presented at the Midwestern Association of Forensic Sciences 2016 Conference, Branson, MO.
- *Genuine, Disguised, and Simulated Signatures; Kinematics of Handwriting; Formal and Informal Signatures*
  - Co-presented with Lloyd Cunningham at the Australasian Society of Forensic Document Examiners, Inc., Sydney, Australia 2016.
- *Document Examination in the USA*
  - 2-day seminar presented at the Institute of Forensic Science Seminar, Beijing, China 2015.
- *Are Fountain Pens Back in Vogue? Characteristics of Fountain Pen Writing and Aqueous Ink Analysis*
  - Co-presented with Lloyd Cunningham, Dr. Valery Aginsky, & William J. Flynn at the 73<sup>rd</sup> Annual Meeting of the American Society of Questioned Document Examiners, Toronto, Canada 2015.
- *The Forensic Examination of Genuine, Disguised, and Simulated Signatures – with an introduction to the Neuroscience and Kinematics of Handwriting (2 days)*
  - 2-day workshop conducted at the II Brazilian Symposium on Forensic Science, Brasilia, Brazil 2015.
- *The Examination of Skillfully Simulated Signatures*
  - Presented at the 67<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Orlando, FL, 2015.
  - Presented at Canada Border Services Forensic Laboratory, Ottawa, Canada, 2015.

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- *Skillful Freehand Signature Simulation* - co-presented with Lloyd Cunningham at the Joint Meeting of the American Society of Questioned Documents Examiners, Inc. & the Australasian Society of Forensic Document Examiners, Inc., Honolulu, HI, 2014.
- *Skillfully Simulated Signatures (1/2 day)* – presented at the European Network of Forensic Handwriting Examiners (ENFHEX) meeting, Riga, Latvia, 2013.
- *Signature Examination of Healthy and Impaired Writers (1 day)* - co-presented with Prof. Michael Caligiuri, UCSD, at the American Academy of Forensic Sciences Annual Conference, Washington DC, 2013.
- *Neural Bases and Characteristics of Signature Formation in Writers with Dementia (1/2 day)*
  - Co-presented with Prof. Michael Caligiuri, UCSD, at the 70<sup>th</sup> Annual General Meeting of the American Society of Questioned Document Examiners, Charleston, SC, 2012.
- *Signature Examination - Translating Basic Science into Practice (1 day)*
  - Co-presented with Prof. Michael Caligiuri, UCSD at the American Academy of Forensic Sciences Annual Conference, Seattle, WA, 2010.
  - Co-presented with Prof. Michael Caligiuri, UCSD at the American Society of Questioned Document Examiners 68<sup>th</sup> Annual General Meeting, Victoria, BC, Canada, 2010.
- *Genuine, Disguised, and Forged Signatures (1/2 day)*
  - Presented at the 1st Eurasian Congress on Forensic Sciences, Istanbul, Turkey, 2008.
  - Presented at the Victoria Forensic Science Centre, Melbourne, Australia, 2008.
  - Presented at the European Network of Forensic Handwriting Experts (ENFHEX) Meeting, Krakow, Poland, 2009.

**Papers**

1. Caligiuri, M., Mohammed, L., Lanners, B. & Hunter G. (2017). *Kinematic Validation of FDE Determinations About Authorship in Handwriting Examination*. Presented at the 75<sup>th</sup> Annual Conference of the American Society of Questioned Document Examiners, San Diego, CA.
2. Mohammed, L. (2017). *The Kinematics of Signatures and Handwriting*. Presented at the 2<sup>nd</sup> Saudi International Conference on Forensic Medicine and Sciences, Riyadh, Kingdom of Saudi Arabia

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3. Domitrovich, S. Judge, Seaman Kelly, J., Mohammed, L. (2017). *A Review of the Almeida V. Center for Investigative Reporting, Inc. Decision: Analysis and Counter-Analysis*. Presented at the American Academy of Forensic Science Conference, New Orleans, LA.
4. Mohammed, L. (2016). *Document Examination – not just handwriting*. Presented to the Young Forensic Scientists Forum, American Academy of Forensic Science Conference, Las Vegas, NV.
5. Mohammed, L. (2014). *Kinematic approach to signature analysis*. Presented at the 3<sup>rd</sup>. International Workshop on Automated Forensic Handwriting Analysis, Honolulu, HI.
6. Mohammed, L. (2013). *Handwriting stroke kinematics*. Presented at the Measurement Science and Standards in Forensic Handwriting Analysis conference, NIST, Gaithersburg, MD.
7. Mohammed, L., Found, B., Caligiuri, M., Rogers, D. (2012). *Dynamics of stroke direction in genuine and forged signatures*. Presented at the American Academy of Forensic Sciences Conference, Atlanta, GA.
8. Mohammed, L., Found, B., Caligiuri, M., Rogers, D. (2009). *Pen pressure as a discriminating feature between genuine and forged signatures* – Presented at the International Graphonomics Society Conference, Dijon, France.
9. Mohammed, L., Found, B., Caligiuri, M, Rogers, D. (2009). *Can dynamic features be used to discriminate between genuine, auto-Simulated, and simulated signatures?* - Presented at the 61st Annual Conference of the American Academy of Forensic Sciences, Denver, CO.
10. Mohammed, L. (2008). *Judicial challenges to expert witness testimony in the USA: The Daubert Trilogy* -Presented at the 1st. Eurasian Congress on Forensic Sciences, Istanbul, Turkey.
11. Mohammed, L., Found, B., Rogers, D. (2008). *Genuine and disguised signatures – An empirical approach* - Presented at the 60th Annual Conference of the American Academy of Forensic Sciences, Washington, DC.
12. Mohammed, L., Williams, D. (2006). *Preparing demonstrative charts with the use of Adobe Photomerge®* - Poster presentation, American Academy of Forensic Sciences, Seattle, WA.
13. Mohammed, L. (2005). *The Edge of Light™ Scanner* - Presented at the American Academy of Forensic Sciences Conference, New Orleans, LA.
14. Mohammed, L. (2003). *Daubert and documents* – Presented at the California Association of Criminalists Fall Conference, San Diego, CA.

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15. Mohammed, L. (2003). *A standardized training program for Forensic Document Examiners – A proposal*- Presented at the 61<sup>st</sup> Annual Conference of the American Society of Questioned Document Examiners, Baltimore, MD.
16. Mohammed, L. (2001). *Demonstrative evidence and multi-media technology* - Presented at the 59<sup>th</sup> Annual Conference of the American Society of Questioned Document Examiners, Des Moines, IA.
17. Mohammed, L., Buglio, J., Shafer, A. (2000). *The influence of paper on the performance of the VSC-2000 spectrometer* - Presented at the 58<sup>th</sup> Annual Conference of the American Society of Questioned Document Examiners, Ottawa, Ontario, Canada.
18. Mohammed, L., Buglio, J. (2000). *The Association of Forensic Document Examiners* - Prepared for the 58<sup>th</sup> Annual Conference of the American Society of Questioned Document Examiners, Ottawa, Ontario, Canada.
19. Mohammed, L. (1992). *Cocaine and handwriting* - presented at the 50<sup>th</sup> Annual Conference of the American Society of Questioned Document Examiners, Milwaukee, WI.
20. Mohammed, L. (1991). *Signature disguise in Trinidad and Tobago* - presented at the 49<sup>th</sup> Annual Conference of the American Society of Questioned Document Examiners, Orlando, FL.

**PROFESSIONAL AFFILIATIONS**

- American Society of Questioned Document Examiners
  - President, 2010 – 2012
  - Vice-President, 2008 – 2010
  - Treasurer, 2006 – 2008
  - Director, 2004 – 2006;
  - Annual Conference Program Chair, 2006 & 2017
  - Chair, Evaluation and Examination Committee, 2002 – 2006
  - Annual Conference Site Chair, 2002
- American Academy of Forensic Sciences
  - Chair – Questioned Documents Section, 2016 –
  - Secretary – Questioned Documents Section, 2014 – 2016
  - Fellow – Questioned Documents Section
- Canadian Society of Forensic Science
- Chartered Society of Forensic Sciences

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**PROFESSIONAL ACTIVITIES**

- Member – Academy Standards Board, 2017 –
- Member – Expert Working Group on Human Factors in Handwriting Examination, National Institute of Standards and Technology, 2015 –
- Member – Physics/Pattern Scientific Area Committee within the National Institute of Standards and Technology Organization of Scientific Area Committees (NIST/OSAC), 2014 – 2016.
- Participant in the General Forensics Technology Working Group, National Institute of Justice, 2011
- Participant in Scientific Working Group on Documents (SWGDOC), 2009 – present
- Grant reviewer for the National Institute of Justice and affiliated agencies, 2009 – present
- Editorial Review Board Member:
  - Journal of Forensic Sciences
  - Journal of the American Society of Questioned Document Examiners
  - Forensic Science and Technology (China)
- Guest reviewer:
  - Forensic Science International
  - Science & Justice
  - Australian Journal of Forensic Science
  - Egyptian Journal of Forensic Sciences
  - IEEE Transactions on Cybernetics

**CONTINUING EDUCATION**

- American Society of Questioned Document Examiners, San Diego, CA 2017
  - Forensic Science Research: Your Mission to Propose, Innovate, and Collaborate
  - Preparing a Digital Signature File for Forensic Analysis
  - Chinese Handwriting and Signatures Workshop: Hanzi Through the Eyes of the Forensic Document Examiner
  - Write or Wrong? Bias, Decision-Making, and the Use of Contextual Information in Forensic Document Examination
- American Society of Questioned Document Examiners, Pensacola, FL 2016
  - Measuring Frequency Occurrence in Handwriting and Hand Printing Characteristics
  - Sequence of Entries Determination – New Approach to Additional Print
- American Society of Questioned Document Examiners, Toronto, Canada 2016
  - Principles of Forensic Examination of Arabic Signatures

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- American Society of Questioned Document Examiners, Honolulu, HI 2014
  - Adobe - Digital Media & Evidence
- American Academy of Forensic Sciences, Seattle, WA 2014
  - Science, Law, and the Inferential Process: The Epistemology of Scientific Conclusions
- National Institute of Standards and Technology (NIST), Gaithersburg, MD 2013.
  - Measurement Science and Standards in Forensic Handwriting Analysis
- American Academy of Forensic Sciences, Atlanta, GA, 2012
  - Paper Fundamentals for Forensic Document Examiners
  - Digital Photography for Forensic Document Examiners
- American Society of Questioned Document Examiners, Philadelphia, PA, 2011
  - Printing Process Identification for Forensic Document Examiners
  - Using Adobe Photoshop in a QD Workflow
- American Society of Questioned Document Examiners, Victoria, BC, Canada, 2010
  - Electronic Recording and Analysis of Handwritten Signatures & Writing
- Cedar Crest College, Allentown, PA, 2010
  - Multivariate Analysis for Forensic Scientists: Statistical Pattern Recognition for Physical Evidence Analysis and Chemometrics
- American Academy of Forensic Sciences, Denver, CO, 2009
  - Estimation of Uncertainty – Is Anyone Certain What This Means?
  - Security Documents before and After the Crime: REAL ID, Physical and Electronic Security Features, Developments in Commercial Printing Technology, and an Introduction to Counterfeit Link Analysis
- American Academy of Forensic Sciences, Washington DC, 2008
  - The Applications of Color Analysis and Light Theory in the Forensic Examination of Documents Workshop
- American Society of Questioned Document Examiners, Portland, OR 2006
  - Fine and Subtle Features of Handwriting Workshop
  - Signature Workshop
- Southeastern Association of Forensic Document Examiners, Atlanta, GA, 2006
  - Disguised and Forged Signatures Workshop
- American Academy of Forensic Sciences, New Orleans, LA, 2005
  - State of the Art Infrared and Ultraviolet Examinations of Documents by the Video Spectral Comparator
- California Criminalistics Institute, Sacramento, CA, 2005
  - Technical Writing for Criminalists

CURRICULUM VITAE – LINTON A. MOHAMMED

- American Board of Forensic Document Examiners, Las Vegas, NV, 2004
  - Daubert Seminar
- American Academy of Forensic Sciences, Chicago, IL, 2002
  - Note Taking for Forensic Document Examiners Workshop
- Rochester Institute of Technology, Rochester, NY, 2002:
  - Printing Process Identification and Image Analysis for Forensic Document Examiners
- Limbic Systems, Inc., Bellingham, WA, 2001:
  - Measurement of Internal Consistencies Software (MICS)
- American Board of Forensic Document Examiners, Norcross, GA, 2000:
  - Canon Photocopier and Facsimile Training Workshop
- California Criminalistics Institute, Sacramento, CA, 2000:
  - Special Topics in Questioned Documents
- Southwestern Association of Forensic Document Examiners, Las Vegas, NV, 1999:
  - Typewriter Examination & Classification Workshop
- American Board of Forensic Document Examiners, Las Vegas, NV, 1998:
  - Examination Techniques in Handwriting & Rubber Stamp Cases Seminar
- Canadian Society of Forensic Science 44<sup>th</sup> Annual Conference, Regina, Saskatchewan, Canada, 1997:
  - Digital Image Processing Workshop
- California Criminalistics Institute, Sacramento, CA, 1997:
  - Courtroom Presentation of Evidence
- American Society of Questioned Document Examiners 55<sup>th</sup> Annual Conference, Scottsdale, AZ, 1997:
  - Handwriting Workshop
- American Society of Questioned Document Examiners 51<sup>st</sup> Annual Conference, Ottawa, Canada, 1993:
  - Laser Printer Workshop
  - Miscellaneous Document Examination Workshop
- American Society of Questioned Document Examiners 50<sup>th</sup> Annual Conference, Milwaukee, WI, 1992:
  - Signature Workshop

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- American Society of Questioned Document Examiners 49<sup>th</sup> Annual Conference, Orlando, FL, 1991:
  - Canon Fax Workshop
  - Deposition Testimony Workshop
  - Expert Witness Workshop
  - Signature Comparison Workshop

September 27, 2017